

**Back 40 Mining Permit Application
Review Comments
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Where is the report on potential acid mine drainage and heavy metal contamination?

“Modeling to predict the potential generation of acid, dissolved metals, and other related substances will be discussed in a separate report as mentioned in Section 1.2 of this report.” (*Geochemical Investigation Report, Back Forty Project, Project ID: 14A021, June 2015 p. 3*).

Where is this report and why isn't it part of the mine permit application? How can the public evaluate the impact of this project if one of the most important pieces of information about the environmental effects of this project is missing from this application?

Water Quality Problems Are Underestimated

The Environmental Impact Assessment asserts that the sulfate deposition impact is minimal and that “the acid deposition standard shows the Project rate will not exceed the standard (p. 56).” There is no analysis of what will happen if acid-forming wastes leach into groundwater or runoff into surface water. What are the long-term effects of acid mine drainage and heavy metal releases into the environment and can these effects be mitigated or reversed?

Jim Kuipers and Ann Maest analyzed water quality predictions and outcomes at 25 representative metal mines permitted in the United States during the last 25 years. They have shown that despite assurances from government regulators and mine proponents that mines would not pollute clean water, 76 percent of studied mines exceeded water quality standards, polluting rivers, and groundwater with toxic contaminants, such as lead, mercury, arsenic and cyanide, exposing taxpayers to huge cleanup liabilities. They also found that predictions were often made using inadequate information, incorrectly applied. (*“Predicting Water Quality Problems at Hardrock Mines: A Failure of Science, Oversight, and Good Practice,”* An Earthworks white paper summarizing and analyzing groundbreaking studies by Ann Maest, PhD and Jim Kuipers, P.E., Washington, DC: December 2006)

Why is mercury exempted from the list of potential trace metal contaminants?

“Waste rock and tailings samples are enriched in some trace metals and metalloids, including antimony, arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc, present at three or more times the average crustal abundance. Kinetic testing indicates that these trace metals with the exception of mercury, are readily leached from most rock samples and many tailings samples.”

(*Geochemical Investigation Report, Back Forty Project, Project ID: 14A021, June 2015* p. vii)

Why is mercury exempted from the list of trace metals that “are readily leached from most rock samples and many tailings samples”? It is well known that mercury in the overburden and tailings will methylate after it is excavated and cause impacts to biota and fish in the Menominee River. Sulfide deposits from which ores are mined “are often associated with mercury, according to the EPA. The EPA has found that “locations at mining sites that serve as sources of mercury include direct seeps, as well as leachate from tailings or spoil piles (U.S. EPAQ-823-R-09-002, *Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion 14*, 2009, available at <http://www.epa.gov/waterscience/criteria/methylmercury/pdf/guidance-final.pdf>).”

The Menominee River adjacent to the proposed mine site and the northern-most Shakey Lake, Spring Lake, currently exceed the mercury water quality standard. The assertion that a mercury deposition increment would result in a “*de minimis*” change to this baseline condition is unjustified and misleading (“Potential Air Deposition Impacts,” *Environmental Impact Assessment, Back Forty Project*, October 2015, Project I.D.: 14A021, p. 56).

Why is uranium and its daughter products missing from the list of potential trace metal contaminants?

Why is uranium missing from the list of trace metals that may be leached from the waste rock and tailings? Table 4-8 of *Geochemical Investigation Report, Back Forty Project, Project ID: 14A021, June 2015* shows slightly elevated uranium concentrations in several portions of the orebody. The average concentrations of gross alpha, gross beta, radium-226, and radium 228 are highest at sampling stations nearest to the mineral deposit (*Hydrogeology Report Environmental Baseline Studies*, September 2011, p. 44). Given the high sulfur content of the waste rock and tailings, sulfuric acid produced with rainwater can gradually leach out uranium and its daughter products from storage piles. According to the Environmental Protection Agency, “These effluents should meet Federal and State discharge standards where applicable before such releases are permitted” (*Natural Radioactivity Contamination Problems: A Report of the Task Force, EPA-520/4-77-015*, February 1978, p. 54).

The Flambeau Mine in Ladysmith was not successfully backfilled and reclaimed

Aquila's mine permit application states that "Reclamation of the pit is patterned after the successfully backfilled and reclaimed Flambeau Mine in Ladysmith, Wisconsin..." ("Potential Impacts Due to the Backfilled Pit," in *Environmental Impact Assessment, Back Forty Project*, October 2015, Project I.D.: 14A021, p. 19).

Groundwater at the Flambeau Mine site has *not* been protected from contamination. Monitoring data submitted by Flambeau Mining Company (FMC) itself to the Wisconsin Department of Natural Resources (DNR) shows significant pollution in the groundwater within the backfilled pit and in two Intervention Boundary wells located directly between the backfilled pit and the Flambeau River.

Pit Water Contamination

Dr. David Chambers and Dr. Kendra Zamzow (Center for Science in Public Participation, Bozeman, Montana) have noted that "Ten years after backfilling, manganese concentrations in pit pore water remain underestimated by more than an order of magnitude in four of the eight pit monitoring wells (MW-1013, 1013B, 1013C, and 1014B), and fluctuate strongly in three of the remaining four (MW-1013A, 1014, 1014A)." (*Report on Groundwater and Surface Water Contamination at the Flambeau Mine*, June 2009).

Foth, which provided reports for the Flambeau Mining Company, predicted that manganese levels within the backfilled pit would top off at about 550 mcg/l (as compared to a pre-mine baseline of 230 mcg/l) and that it would take over 4000 years for the level to drop from 550 mcg/l to baseline. In reality, levels in MW-1013B have, to date, gone as high as 42,000 mcg/l. In other words, Foth underestimated the manganese level by a factor of 75, and the 4000-year timeline for the pollution to dissipate has likely been underestimated as well. This is no small matter, as the medical literature reports that consuming water with a manganese level of about 14,000 mcg/l (a third of that found in MW-1013B) is associated with causing the kind of nerve damage seen in Parkinson's disease.

Groundwater Contamination from Backfilled Pit to the Flambeau River

As noted by Chambers and Zamzow (*Report on Groundwater and Surface Water Contamination at the Flambeau Mine*, June 2009), "There have been consistent and statistically significant exceedances of 1991 Flambeau Mine permit standards at MW-1000PR (located about 125 feet from the Flambeau River, directly between the backfilled pit and the river) for manganese, calcium, conductance and TDS [Total Dissolved Solids]...It is apparent from the MW-1000 PR data that groundwater contamination is exiting the pit toward the river..."

Indeed, FMC's own monitoring data shows that manganese levels in MW-1000 PR have exceeded the Flambeau Mine Permit standard of 550 mcg/l **by up to 10 times**.

As FMC's own data proves, the Flambeau Mine was **no success** in terms of protecting groundwater quality.

Adding limestone to the backfilled waste rock to neutralize pH during post closure, as proposed in the Environmental Impact Assessment (p. 20), as was employed at the Flambeau Mine, **did not neutralize reactions within the pit**. Reactions –dissolution and precipitation of metals – continue to occur within the pit.

Mine design plans at the Flambeau Mine, as at the Back Forty Project, called for the development of a bentonite slurry cutoff wall between the pit and the Flambeau River to limit movement of water exiting the pit. It is possible the contaminated water is now moving around, under or through the slurry cutoff wall. An open records request of the Wisconsin DNR revealed that Flambeau Mining Company knew in 1989, before the mine was built, that the rock between the pit and the river was **“fractured”** and that the contaminated groundwater leaving the mine pit would **“flow directly into the bed of the Flambeau River.”**

Surface Water Pollution at the Flambeau Mine Site

In 2010-2011 the Wisconsin DNR conducted surface water sampling at a number of locations on Flambeau Mine property, in Stream C, and in the Flambeau River. DNR concluded that “Surface water copper and zinc concentrations at multiple sites in the Stream C watershed exceed the acute toxicity criteria on a frequent basis (Stream C Report, p. 20).” Nearby streams unaffected by past copper mining did not show any copper toxicity. According to DNR regulations, the “acute toxicity criterion” or “ATC” is the maximum daily concentration of a substance which ensures adequate protection of sensitive species of aquatic life from the acute toxicity of the substance and will adequately protect the designated fish and aquatic life of the surface water if not exceeded more than once every 3 years.” NR 105.03(2), Wisconsin Administrative Code.

DNR found a strong correlation between elevated copper in soils impacted by historic mining activities and elevated copper in stormwater runoff: “The southeast corner of the mine site that drains to Stream C was **not fully reclaimed** and soil sampling by FMC in this area found multiple locations with elevated copper concentrations. Areas with high copper concentrations were generally correlated with high runoff water copper concentrations (Stream C Report, p. 3).”

In April 2012, the DNR completed an investigation of water quality at the Flambeau Mine site and, as a result, proposed to include Stream C at the Flambeau Mine site on its list of “impaired waters” for “acute aquatic toxicity” caused by copper and zinc (see <http://dnr.wi.gov/water/impairedDetail.aspx?key=3924686>

In June 2014, the U.S. Environmental Protection Agency listed Stream C at the Flambeau Mine site as “impaired waters” due to copper and zinc toxicity directly linked to the Flambeau Mine operation.

To use the failed reclamation of the Flambeau Mine as a model will not protect either groundwater or surface water quality in the Menominee River.

Climate Change and Floodplain Impacts

Section 3.6.4 of the Environmental Impact Assessment states that there will be no negative impacts to the Project resulting from a 100-year flood (p. 30). This prediction does not take into account the increases in amounts of very heavy precipitation in the Midwest from climate change. The closest mine structure to the floodplain is the mine pit. Figure 3-23 of Vol. II shows that a 100-year flood event raised the Menominee River to 212 feet, which comes close to the pit edge of 214 feet. In September 1994 heavy rains in Ladysmith exceeded the 100-year flood event and the Flambeau River came within 4 feet of the mine pit. The mine pit was less than 150 feet from the river.

Extreme weather events are more frequent in the present era of climate change. Operational plans to prevent flooding of the mine pit and the release of contaminants from the waste storage areas need to take into account 200 year and 500 year flood events.

Life of Mine (LOM) projections differ in mine permit application and Aquila’s disclosure to shareholders

Section 5.5.5.2 and 5.5.5.3 of the Mining Permit Application (October 2015) clearly state that “The Project does not include underground mining, consequently, material damages to structures or natural features resulting from underground mining will not occur (p. 22).”

However, according to Aquila’s website, the Back Forty project anticipates “mining 16.1 Mt of mineralized material over the **16 –year life of mine (LOM)**, of which 12.5 Mt is **open pit** and 3.6 Mt is **underground.**” See <http://www.aquilaresources.com/wp-content/uploads/2016/01/Aquila-Resources-Investor-Presentation-January-2016.pdf>

A 7-year LOM will have substantially different impacts to the environment than a 16-year LOM. If MDEQ proceeds on the assumption that the project does not include underground mining, there will be no opportunity to describe, evaluate and mitigate the impacts of a 16-year LOM. If Aquila is planning an underground mining operation, this information needs to be disclosed at the time its mine permit is being evaluated. To do otherwise is to knowingly deceive the public in the permitting process.

Cyanide Leaching

The Oxide Plant will use a cyanide leach process to produce the gold and silver. “At one time,” according to the EPA, “acid generation at cyanide sites was not considered to be a potential problem as many mining facilities used only oxide ores (not sulfide ores).

However, cyanide-leaching facilities have reported cases of acid generation. Even tailings that were originally alkaline have subsequently experienced acid generation. Although lime may be added during cyanide leaching, with residuals existing in tailings or agglomerated heaps, the lime component eventually washes away through weathering leaving sulfide compounds to form acid drainage (*Technical Report: Treatment of Cyanide Heap Leaches and Tailings*, U.S. EPA, September 1994, p.23).

Where are the estimates of cyanide concentrations in waste tailings at the mine site?

Cyanide accidents happen regardless of process. Flotation and heap leach ore processing each use many of the same technologies. More than half of 62 recent accidents in Montana—before voters there restricted the use of cyanide in mining in 1998—were caused by liner leaks, waste spills, human error or storm events—problems common to all forms of mining.

Waste dump and liner failures have taken place at mines around the world in recent years. For example:

In 1998, six to seven tons of cyanide-laced tailings spilled from the Homestake Mine into Whitewood Creek in the Black Hills of South Dakota, resulting in a substantial fish kill.

In 1998 and 1990, a series of eight cyanide leaks occurred at Echo Bay Company’s McCoy/Cove gold mine in Nevada, releasing a total of almost 900 pounds of cyanide into the environment.

In January 2000, the Aural gold processing plant in Baia Mare on the Romanian-Hungarian border released 100 tons of cyanide contaminated water into the Tisza River, a major waterway that spans Romania, Hungary and the former Yugoslavia, eventually emptying into the Danube. The cyanide plume was measurable at the Danube delta, four weeks later and 2,000 km from the spill source.

More than 1400 tons of fish died as a result of this accident that also destroyed the livelihood for some hundred fishermen along the Tisza River.

The use of cyanide poses an unreasonable risk to the health of people, wildlife and fish in the Menominee River. Cyanide is an extremely toxic and volatile chemical. Cyanide measured in the small parts per billion range are toxic or cause injury to fish and other aquatic life.

Transportation Accidents Involving Cyanide

There is no information in the mine permit application on the routes that will be used to transport cyanide to and from the mine. Should a tanker spill or a waste dump leak or overflow and fail to contain cyanide-laced mining wastes, the result could be catastrophic. Federal records of the Emergency Release Notification System show at least 23 transportation-related spills of cyanide in the U.S. in recent years. Under certain conditions, cyanide can break down to form compounds with chemicals and metals. But many of these cyanide-related compounds remain toxic and are not regulated or monitored.

The mine permit application does not mention that there are alternatives to cyanide. The EPA lists several alternative chemicals used in zinc and copper mining that serve the same function as sodium cyanide. For zinc mining, they are sulfur dioxide, zinc sulfate, sodium hydrogen sulfide, and for copper mining: zinc hydrosulfate, dichromate, zinc sulfate, and sodium bisulfate.

Cultural and Archaeological Resources

There are significant cultural resources, including the extensive ridged fields and prehistoric burial mounds within the project area. However, there has been no comprehensive survey of traditional and cultural properties of importance to the Menominee Indian Tribe of Wisconsin in the project area and along the Menominee River, including the Sixty Islands locality. “The presence of the ridged field complex (20ME61) extending 450 m (1,500 ft.) inland demonstrates the potential to discover garden bed features along the Menominee River in portions of the study area that have not been previously surveyed for such features (*Archaeological Investigations of the Aquila Resources Inc., Back Forty Project Area Menominee County, Michigan*, July 2015, p. 3-9.” Likewise, there is

No cultural/archaeological survey of the project area can be considered scientifically adequate without the participation of the Menominee Nation in the formal identification, evaluation, and protection of the cultural resources held sacred by Menominee Tribal members. Without Menominee Tribal participation and consultation in the identification and evaluation of cultural properties it is meaningless to suggest that within the mine project area, “a barrier will be installed to separate the cultural resources from the potentially harmful mining activities (*Environmental Impact Assessment, Back Forty Project*, October 2015, Project I.D.: 14A021, p. 49).”

